

Regulatory Exploitation and the Market for Corporate Control

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Abstract

This paper evaluates the possibility that a failure to exploit regulatory loopholes could result in the ousting of management. We use the U.S. hospital industry in 1985-1996 as a case study. A 1988 change in Medicare rules widened a pre-existing loophole in the Medicare payment system, presenting hospitals with an opportunity to increase operating margins by 5 or more percentage *points* simply by “upcoding” patients to more lucrative codes. We find that “room to upcode” is a statistically and economically significant predictor of whether a hospital replaces its management with a new team of for-profit managers. We also find that hospitals replacing their management team subsequently upcoded more than a sample of similar hospitals that did not, as identified by propensity scores. These results suggest that managers that do not fully exploit regulatory loopholes are vulnerable to replacement.

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1. Introduction

The market for corporate control suggests that owners or managers who “leave money on the table” will be replaced. Whether such ousters (or the threat thereof) increase social welfare clearly depends on the source of the unrealized profits. Obtaining managers who are more skilled at minimizing costs and identifying profitable new markets, for example, will enhance efficiency (even if the new rents are captured entirely by the new managers). In contrast, managers who are skilled at restricting competition may reduce social welfare. In this paper, we consider the possibility that some managers may be unwilling or unable to fully exploit regulatory failures. Replacing them may generate substantial profits for firms at the expense of taxpayers and consumers. Using the U.S. hospital industry as a case study, we examine whether the market for corporate control replaces managers who fail to maximize firm profits in this manner.

The U.S. hospital industry is highly-regulated at both the state and federal level, presenting many opportunities for exploiting regulatory failures. Our empirical analysis is based on an unexpected change in the payment system used by Medicare to reimburse hospitals for inpatient care. This change widened a pre-existing loophole in the system, presenting hospitals with an opportunity to increase operating margins by 5 or more percentage *points* simply by “upcoding” patients to more lucrative codes. Given typical operating margins of less than 2 percent during this time period, this is a substantial figure.

The exact amount of the potential increase in payments depended on the mix of patients in each hospital and the extent to which the hospital was exploiting the loophole prior to the regulatory change. Dafny (2005) finds evidence that hospitals upcoded significantly more following the increase in the incentive to do so. The response of for-profit hospitals was dramatically larger than that of nonprofit or government-owned hospitals, indicating a greater willingness or ability of for-profit managers to exploit this opportunity. This paper defines a hospital-specific, time-varying measure called “room to upcode” (RTU), and examines whether independent hospitals with greater RTU following the 1988 reform were more likely to switch to management by for-profit systems.¹

We compare the predictors of joining a for-profit system in 1985-1987 (the “pre-period”), 1989-1992 (the “treatment” period), and 1993-1996 (the “post period”, during which there was a massive federal crackdown on Medicare fraud).² In addition to RTU, we also examine whether poor operating performance precipitates a switch to for-profit system management. We contrast our findings with the predictors of joining a nonprofit system during each of these periods.

We obtain three main results: (1) during the period immediately following the implementation of the new Medicare rules, 1989-1992, *RTU* was a statistically and economically significant predictor of whether an independent hospital joined a for-profit

¹ As we discuss below, most hospitals “joining” for-profit systems were not acquired outright; rather, these hospitals outsourced the management function to for-profit “contract management organizations”.

² The “pre period” is one year shorter than the others because the data are not available prior to 1985.

system; (2) hospitals that joined systems during this period subsequently increased the extent of upcoding activity relative to similar hospitals that did not join for-profit systems; and (3) *RTU* is not associated with joining a for-profit system before 1988 or after 1992 or joining a nonprofit system at any time.

At a broad level, these results suggest that managers that do not exploit regulatory loopholes are vulnerable to replacement by managers who will. In industries where the market for corporate control is particularly efficient, such as finance, the implication is that managers may feel compelled to violate the “spirit” (and potentially the “letter”) of the law to retain their jobs. This phenomenon may help to explain the prevalence of brokerages permitting late trading of mutual funds through 2003 despite regulations intended to curb the practice, tax advisers designing shelters in clear violation of IRS guidelines, and the like. Efforts to use moral suasion rather than regulatory oversight to reduce such behaviors are less likely to succeed in industries with active markets for corporate control.

To set the stage for our case study, the following section describes hospital systems, including prior related research. Section 3 provides information on Medicare’s Prospective Payment System and the regulatory change in 1988. The data are described briefly in section 4. Section 5 presents our empirical approach together with the estimation results. Section 6 concludes.

2. Background

A. Hospital Systems in the 1980s and 1990s

Over the past few decades, U.S. hospitals have been subject to increasing financial pressure exerted by public and private payers. These pressures stimulated a major transformation of the industry, including large numbers of closures, mergers, and acquisitions by groups of affiliated hospitals (“systems”). A system consists of a group of affiliated hospitals that identify themselves as such to the American Hospital Association. Systems can bring considerable expertise to hospitals in the areas of labor management, marketing, and information technology. Systems can also negotiate jointly with suppliers and insurers. “Contract management organizations” (CMOs) are an important class of systems. CMOs are for-profit companies that specialize in managing hospitals.³ They can bring the same benefits to hospitals as other systems, with the exception that they cannot negotiate joint prices with insurers. Hospital boards who seek to improve performance while maintaining asset ownership can outsource day-to-day management functions to CMOs.

Table 1 presents the number of community hospitals, by ownership status, at the start and end of our study period.⁴ Despite a decline of 13 percent in the number of facilities, the shares by ownership have remained virtually unchanged. The vast majority of hospitals are not-for-profit or government-owned; for-profit facilities account for roughly 15 percent of community hospitals. A COLUMN WITH CMO?

³ Some systems consist of contract managed and wholly owned-hospitals.

⁴ Community hospitals are non-federal, non-state hospitals where the average length of stay is less than 30 days.

Table 1 reveals that it is common for hospitals to replace management by joining systems. Boards seeking to improve the performance of their hospitals by joining systems face an important choice. They can sell the hospital outright or merely cede management control to a CMO. In the time period that we study, the vast majority of the nonprofit and government hospitals that joined for-profit systems opted for contract management.

If a hospital agrees to join a CMO, then there must be some expectation that the partnership will add value; that is, the CMO will boost hospital revenues above and beyond the additional management costs. CMOs must also be aware that the financial performance of their clients is public information (financial records are disseminated by the federal Center for Medicare and Medicaid Services). Thus, CMOs will therefore be evaluated by potential clients on the basis of how well they improve performance at current clients. Thus, we would expect that hospitals are more likely to partner with CMOs when it is easier for the CMOs to improve performance.

We will focus in this paper on the transfer of management control of independent hospitals to hospital systems, including CMOs. We focus on independent hospitals because they are most likely to benefit from the management expertise afforded by systems. Table 2 reports the total number of hospitals that were independent in 1985 and part of a system by 1986, by ownership type of the acquirer and target.⁵ Of 3259 independent community hospitals in the United States in 1985, 742 became part of a hospital system by 1986. These hospitals (henceforth “targets”) came from all ownership types, while the systems (henceforth “acquirers”) tended to be privately-owned. FIX TO INCLUDE CMOS?

Although our study focuses on the predictors of *individual* acquisitions, the extensive literature on aggregate consolidation trends informs our analysis and helps to frame the findings. Town and Vogt (2006) provide a thorough summary of this research, which primarily focuses on one-to-one consolidations. The most rigorous studies of these combinations find evidence for large post-merger price increases in concentrated markets, together with modest decreases in costs. A small number of papers specifically address the formation and function of hospital systems. Dranove and Lindrooth (2003) and Connor et al (1997) find that integration into multi-hospital systems has no impact on hospital costs. Cuellar and Gertler (2005) show that system membership is more likely among hospitals that are for-profit, located in urban areas, or have high managed care loads. Mobley (1997) documents that not-for-profit systems tend to acquire multiple hospitals in a local market area, while for-profits have broader geographic spread. Although the former would be a more effective way to obtain market power, and possibly to achieve cost efficiencies as well, for-profit systems may have rejected this strategy due to concern over antitrust enforcement actions. Setting aside the issue of different objective functions and penalties (perceived and actual) faced by chains of different ownership type, these patterns suggest that not-for-profit and for-profit acquisition strategies differ dramatically, a prediction that is corroborated by our findings.

There is a much smaller literature on CMOs. Alexander and Morrissey (1989) and Alexander and Lewis (1984) both find that hospitals that join CMOs tend to be

⁵ Some hospitals may have changed hands more than once during this time period. These figures represent ownership status as of 1985 and 1986.

smaller than their peers and were experiencing weaker financial performance prior to joining.

B. Gaming Governmental Regulations

To our knowledge, there are no prior studies examining regulatory exploitation as a motive for consolidation, nor are there systematic evaluations of takeovers to eliminate “X inefficiency” more generally.⁶ However, a long literature documents firms’ responses to regulatory incentives, dating back to Averch and Johnson’s 1962 paper on investment by public utilities subject to rate-of-return regulation. More recent papers include Duggan and Scott Morton (2005) and Kyle (2005) on pharmaceutical companies’ responses to price regulation, Desai and Hines (2002) on American corporations’ efforts to avoid U.S. taxes on foreign income, and Goolsbee (2000), Rose and Wolfram (2002), and Hall and Leibman (2000) (among others) on the responsiveness of executive compensation to tax incentives. The possibility that firm structure could be influenced by the ability or willingness to take advantage of regulatory loopholes follows naturally from this research.

The results from both literatures – hospital consolidation and regulatory exploitation – shape the specifications we estimate below. Our empirical analysis focuses on a policy change that generated plausibly exogenous variation in the potential profits from upcoding within individual targets. The following section describes Medicare’s reimbursement system, the policy change in 1988 that increased the payoff to upcoding, and the formula we use to measure *RTU* for each hospital and year. In the data section, we describe the controls we use for the two canonical takeover motives, efficiency and market power. The empirical specifications also include hospital and market-specific characteristics known to be associated with aggregate consolidation patterns.

3. Room to Upcode: A Measure of Foregone Opportunities to Exploit Medicare Reimbursement Policies

A. Medicare Payment Rules and Opportunities for Exploitation

The federal Medicare program accounts for nearly one-third of hospital revenues nationwide, and is the largest payor for most hospitals (Winter and Pettengill 2003). Prior to 1984, Medicare reimbursed inpatient stays on a fee-for-service (i.e. cost-plus) basis. Under the Prospective Payment System (PPS) introduced in 1984, Medicare pays hospitals a fixed fee per admission, where the fee depends on the patient’s primary medical condition, or diagnosis-related group (DRG). The formula can be approximated as

$$(1) \quad P_{hd} = P_h \cdot (1 + IME_h) \cdot (1 + DSH_h) \cdot DRG \text{ weight}_d$$

where P_h is a hospital-specific amount (inflated annually by a Congressionally-approved “update factor”), IME_h represents a (positive) adjustment for indirect medical education (teaching), and DSH_h adjusts payment levels to compensate hospitals with a disproportionate share of indigent patients.⁷ The DRG weights reflect the relative

⁶ “X inefficiency,” a term coined by Leibenstein (1966), refers to a phenomenon in which firms with similar inputs and technology achieve different levels of output.

⁷ This simplified formula appears in Cutler (1995).

resource intensity of admissions to each DRG, and are recalculated each year by taking the ratio of average nationwide costs in each DRG to average nationwide costs for all hospitalizations. In 1990 (midway through our study period), the maximum weight of 13.4638 was associated with admissions for “Respiratory System Diagnosis with Tracheostomy,” while admissions for “False Labor” earned the minimum weight of .1186. The *case-mix index* for a hospital is the average DRG weight for its admissions.

Hospitals are responsible for assigning patients to the appropriate DRGs. This system provides a strong incentive to classify patients into the most remunerative DRGs, a practice known as “upcoding.” The term refers to a broad set of actions, ranging from careful documentation of all comorbidities to ensure appropriate reimbursement to liberal interpretations of rules to outright manipulation of the patient record. (When upcoding involves intentionally misstating the diagnosis, it rises to the level of fraud and is covered under Federal False Claims Act of 1986.) Given the breadth of this definition, there are a number of reasons why hospitals do not upcode maximally.

Upcoding requires careful attention to medical records, sophisticated software, and trained coding personnel. The annual fees charged by independent coding consultants can reach into the millions. Hospital systems may therefore enjoy substantial expertise and economies of scale arising from centralized coding efforts. Where clearly illegal practices are concerned, systems are again likely to have an economic advantage. As described by Dafny (2005), the extent of upcoding involves a tradeoff that accounts for the expected cost of punishment. A system already engaging in questionable upcoding at one hospital may reason that doing so at additional hospitals will have only an incremental effect on the punishment cost.

Variation in upcoding proclivity may also be due to variation in owners’ willingness to upcode, and/or to differences in the incentives provided to managers to do so. Not-for-profits may avoid the “gray areas” of upcoding in order to preserve their “trust capital” in the community (Glaeser et al.). Many studies find that when it comes to balancing profits against more “altruistic” objectives such as providing community benefits, for-profit hospitals lean more heavily towards profits.⁸ By comparison, one for-profit hospital chain awarded bonuses to managers based on the coded incidence of complications (Lagnado 1997). Indeed, Silverman and Skinner (2004) as well as Dafny (2005) document greater upcoding among for-profit hospitals.

In addition to the higher costs associated with upcoding, critics contend that patient care may be compromised if hospitals manipulate medical records for the purpose of maximizing reimbursement. Furthermore, Medicare’s approach to reining in the costs associated with upcoding -- decreasing the annual cost inflation factor applied to all reimbursements – punishes hospitals equally, regardless of the extent to which they upcode and the type of practices they employ.

B. The 1988 Change in Coding

⁸ For example, see Roomkin, M. and B. Weisbrod, “Managerial Compensation and Incentives in For-profit and Nonprofit Hospitals,” (1999), Brickley, J, Van Horn, R.L, “Managerial Incentives in Nonprofit Organizations: Evidence from Hospitals,” (2002), and Horwitz, Jill, “Making Profits and Providing Care: Comparing Nonprofit, For-Profit, and Government Hospitals” (2005). This raises the question of why a hospital that did not upcode prior to acquisition would agree to be acquired by a system that intended to upcode. Even if managers had a choice and were aware of the acquirer’s intentions, they may have felt that their responsibility to eschew upcoding ended when management changed hands.

Although upcoding was known to be a problem with PPS since its inception, a change to the DRG coding system in 1988 offered hospitals substantial and relatively easy opportunities to upcode. The change pertained to DRG codes belonging to a DRG “pair.” A DRG pair consists of two codes for the same diagnosis. Of 473 codes in 1987, 190 belonged to DRG pairs. Prior to 1988, the “top code” within a pair was utilized for all patients over age 69 and younger patients with complications (CC); the “bottom code” was for younger, uncomplicated patients with the same diagnosis. Analyses performed in 1987 revealed that, on average, charges for patients with CC were much higher than charges for patients without CC, but older patients were not significantly more expensive to treat than younger patients (who were primarily aged 65-69). CMS concluded that “in all but a few cases, grouping patients who are over 69 with the CC patients is inappropriate” (52 *Federal Register* 18877), and they removed the age qualifiers and recalculated the DRG weights using the new categories.

Table 3 provides examples of the three most common DRG pairs and their DRG weights before and after the policy change. The recalibration following the policy change produced a weighted average increase of 11.3 percent in the payments for top codes, and a decrease of 6.2 percent in the payments for bottom codes. This resulted in a substantial increase in the value of coding complications, as compared to the preceding years (1984-1987). Given a typical P_h of \$4000 in 2005, the increase in revenues associated with coding complications is approximately \$700 *per admission*.

We define *RTU* as the increase in the hospital’s average DRG weight (the case-mix index) that would result from a shift of all patients in bottom codes of DRG pairs to the associated top codes. We calculate this measure for each hospital and year using a 20 percent sample of Medicare discharges from the MEDPAR database, described below. Given that hospitals in 1987 had an average case-mix index of 1.14, *RTU* is approximately equal to the percentage increase in Medicare revenues that a hospital could obtain by coding all patients with complications. (As equation (1) indicates, *RTU* is exactly equal to the percentage increase in revenues if the initial case-mix index is 1.)

Figure 1 presents annual boxplots of *RTU* for general, non-federal community hospitals in the non-territorial U.S. The large average increase in *RTU* in 1988 reflects the policy change; the steady decline thereafter reflects the subsequent increase in upcoding. The variation in *RTU* across hospitals in a given year is driven by differences in upcoding practices, the true complication rate, and the share of patients in DRG pairs. A higher true CC rate will diminish *RTU* if the hospital is already reporting all complications. A hospital with a low incidence of cases in DRG pairs will also receive a low *RTU*. Note that the share of patients in DRG pairs also depends on upcoding proclivity, as hospitals may assign patients to paired DRGs as opposed to unpaired DRGs if it is financially advantageous to do so. (Dafny (2005), however, finds no evidence of this practice on average in the years immediately following the policy change.)

C. Defining the Treatment Period

Although the 1988 reform substantially heightened the incentive to upcode and hence to acquire hospitals for the purpose of upcoding, the window to do so effectively ended a few years later. By the early 1990s, researchers and policy makers were raising red flags about upcoding. Several prominent academic papers on the subject appeared in

the early 1990s, including a 1993 *New England Journal of Medicine* article demonstrating that hospitals in New England had systematically engaged in upcoding so as to increase reimbursements.⁹ The Federal Bureau of Investigation ramped up its health care anti-fraud efforts in 1992; within three years, it had tripled the number of agents working on health probes.¹⁰ In 1994, U.S. Senator William Cohen proposed to stiffen Medicare anti-fraud laws, stating that Medicare fraud cost Americans as much as \$100 billion annually.¹¹ A Boston Globe exposé that year suggested that “of all the areas under investigation (by the Department of Health and Human Services), it is coding fraud that might be the most prevalent and costly.”¹² In January 1995, Cohen took over as chair of the Senate Special Committee on Aging, where he promised to continue investigations of health care fraud.¹³

By the mid-1990s, payers were also responding to the challenge of detecting upcoding. Beginning in 1995, HCFA contracted with two Clinical Data Abstraction Centers to validate the accuracy of DRG coding.¹⁴ As of 1996, at least 6 vendors had developed software to help private payers detect upcoding.¹⁵

Given the resources allocated to halting upcoding and the threats of criminal prosecution, we anticipate that the upcoding motive for acquisition lessened substantially by the early 1990s. Our main analysis focuses on the effect of *RTU* on for-profit acquisitions between 1989 and 1992, immediately after opportunities to upcode Medicare patients increased.¹⁶ We contrast these results with specifications estimated for 1985-1987 (the pre-policy years for which data are available), and 1993-1996.

4. Data

We use the *Annual Survey of Hospitals* conducted by the American Hospital Association in 1984-1997 to identify hospitals and system affiliations, and to obtain descriptive characteristics such as number of beds and services provided. *RTU* is calculated using annual data on DRG weights from the *Federal Register* and the 20% MEDPAR dataset for fiscal years 1985-1997. This dataset is a random 20% sample of discharge records (including DRG codes) for Medicare hospitalizations. Hospital

⁹ Assaf et al., 1993, “Possible Influence of the Prospective Payment System on the Assignment of Discharge Diagnoses for Coronary Heart Disease *New England Journal of Medicine*, 329(13): 931-5.

¹⁰ Lipman, L. “FBI Chief: Health-care Fraud Endemic” *Denver Post*, 3/22/1995, p. A-13.

¹¹ Thomas, J., “Senator: Health Care Fraud Costs Staggering” *St. Petersburg Times*, 7/9/1994, p. 6a.

¹² Golden, D. and Kurkjian, S. “The Fraud Factor: Hidden Costs of Health Care” *Boston Globe*, 7/31/1994, p. 1.

¹³ In one prominent case settled by the Department of Justice in 1994, a large for-profit hospital chain (National Medical Enterprises) paid a cash settlement of \$350 million to settle accusations of fraud. The Department of Justice ended its multi-year investigation of fraud by National Medical Enterprises, a large for-profit hospital chain, in exchange for a cash settlement of \$350 million.

¹⁴ These centers reviewed tens of thousands of inpatient records of Medicare patients with selected diagnoses that are prone to upcoding, such as septicemia and metabolic disorders. For example, see DHHS Office of Inspector General (1999). While the total number of records reviewed represents less than 1 percent of total Medicare hospitalizations, they represent a much larger percentage of the chosen diagnoses.

¹⁵ See “Using Software to Detect Upcoding of Hospital Bills,” August 1998. This study evaluates software that was commercially available in 1995 and 1996.

¹⁶ Note *RTU* does not fully capture all upcoding possibilities available to a hospital. First, many private insurers use the same DRG system, or a different system that also rewards upcoding. Second, there are other diagnoses that present different opportunities for upcoding. Third, there are opportunities to upcode outpatients. In addition, the Medicare system is also susceptible to other activities similar to upcoding. Our measure of “room to upcode” might therefore serve as an indicator of whether a hospital is taking full advantage of Medicare rules.

financial data is obtained from the Health Care Reporting Information Set (HCRIS) for fiscal years 1985-1997, also known as the Medicare Cost Reports. Exact latitude and longitude coordinates for the full set of hospitals in every year were purchased from geocode.com.

Our sample is restricted to non-federal, non-state, general service hospitals located in the non-territorial U.S. For each time period we examine, we include only those hospitals that were independent (i.e. unaffiliated with a system) at the start of the time period.¹⁷ We exclude hospitals in any year in which they have fewer than 50 observations in the MEDPAR sample which is used to calculate *RTU*; *RTU* is very noisily measured when the number of admissions is low.¹⁸ We also drop hospitals with religious affiliations, as none were acquired by for-profits during the study period.¹⁹ Last, we exclude hospitals with 30 or fewer beds; only 1 out of 168 such hospitals was acquired by a for-profit system during the treatment period. Appendix Table 1 lists the number of hospitals excluded by each sample restriction for each time period.

Table 4 lists the number of independent hospitals at the start of each period (the “base year,” or the year prior to the first possible acquisition during the period), together with the number acquired by FP and NFP systems. Acquisition activity for both chain types was much greater during the pre and post periods than during the treatment period. These aggregate trends are likely attributable to a response to the implementation of PPS during the early period, and a response to growing managed care penetration during the latter period. As noted earlier, our objective is not to explain these aggregate patterns but rather to understand which particular hospitals are selected for acquisition during a given period. In the following section, we describe the way in which we use data from each period and the assumptions underlying our approach.

Table 5 gives summary statistics for all independent variables during the base years. The non-AHA variables are unavailable in 1984; we note these in the table and use 1985 values instead.

The independent variables are:

- room to upcode (*RTU*): As described above, *RTU* is the increase in a hospital’s average DRG weight that would result if the hospital assigned all patients currently in the bottom codes of DRG pairs to the associated top codes. It is approximately equal to the percentage increase in Medicare revenues available via upcoding in DRG pairs, and is multiplied by 100 to facilitate the presentation of the results.

¹⁷ The reporting of system membership in the AHA data is somewhat noisy. For example, many hospitals are recorded as members of a system in years t and $t+2$, but not in year $t+1$; we do not consider such hospitals as independent in $t+1$. In most such cases, the system code is the same in t and $t+2$. Because system code numbers frequently change, we cannot assume that a different code in $t+2$ reflects a change in ownership. Treating all hospitals with this “ $t+1$ gap” as independent in $t+1$ would augment the sample of independent hospitals by one-third. We performed extensive research for a random sample of 10 such hospitals and found no evidence of a change in ownership during the relevant time period. We also identified 6 hospitals that were the only members of their “systems.” These are also treated as independent, a classification that does not affect the results.

¹⁸ Note that approximately 40 percent of Medicare admissions are assigned to DRG codes, so that hospitals with fewer than 50 admissions have fewer than 20 discharge records, on average, that can generate a positive *RTU* (if they are assigned to bottom codes).

¹⁹ Bearing in mind that targets must agree to be acquired, perhaps non-secular targets were concerned about whether for-profit systems would fulfill their religious missions.

- FP (NFP) distance: This variable measures the straight-line distance, in miles, from a hospital to the nearest hospital belonging to a for-profit (not-for-profit) system; it is censored at 250 miles. This measure reflects the potential for a target to enhance the market power of an acquiring system.²⁰
- residual profits: To obtain a measure of how well a hospital is performing relative to expectations, we obtain the residual from a regression of operating margins on a large set of observable hospital and market covariates commonly used in the health economics literature. Descriptive statistics for these variables are presented in Appendix Table 2.²¹ These regressions are estimated separately by year, using the entire sample of hospitals (i.e. including hospitals that are not independent). *Ceteris paribus*, a well-run hospital should be less likely to be acquired. We also multiply the residual margin by 100 to facilitate the presentation of the results.

All specifications include dummies for 9 geographic regions. These dummies primarily capture differences in the dominance of FP chains across the country. These chains are most active in the South and the West.²² We also estimate specifications using all of the control variables that appear in the residual profit regressions.

5. Empirical Analysis

A. Effect of RTU on the Probability of Acquisition

To determine whether hospitals with high *RTU* are more likely to be acquired by hospital systems, we estimate probit models of the following form:

$$(1) \Pr(\text{acquisition})_{hjr} = \Phi(\beta_1 RTU_{hr} + \beta_2 \text{residual profits}_{hr} + \beta_3 \text{distance}_{hjr} + \delta' \omega_r + [v' X_{hr}])$$

where $j \in [\text{FP}, \text{NFP}]$, h denotes hospital, and r denotes region, ω_r is a vector of region dummies, and X_h is a vector of hospital and market characteristics that are included in We estimate this equation separately for FP and NFP acquisition in order to compare the choices of the two chain types. While there are no unambiguous theoretical predictions regarding differences by ownership status, as discussed earlier the evidence to date on system affiliation as well as upcoding suggests the patterns will differ. The covariates for the FP and NFP acquisition models are identical with the exception of *distance*, which is the number of miles between hospital h and the nearest hospital belonging to a system of type j .

²⁰ We experimented with many versions of this variable and found none to be significant predictors of acquisition.

²¹ These include local zip code demographics (urban status, income, sex and racial composition), percentage of patients on Medicare and Medicaid, Medicare case mix index, 8 bed size dummies, 6 MSA population dummies, ownership type, membership in the Council of Teaching Hospitals, the level of technological sophistication as measured by a count of hi-tech services (cardiac catheterization lab, certified trauma center, computed tomography (CT) scanner, megavoltage radiation therapy and open-heart surgery), state and year fixed effects. Regression results are available by request.

²² The nine regions (as defined by the American Hospital Association) are: New England, Mid-Atlantic, South Atlantic, East North Central, East South Central, West North Central, West South Central, Mountain, and Pacific.

RTU, distance, and residual profits are measures of the three potential acquisition motives discussed above: exploiting regulatory failures, obtaining market power, and improving operating performance in general. While *RTU* and residual profits are theoretically correlated, in practice the correlation coefficient never exceeds .07 in absolute value in any year.

Table 6 presents the results of estimating equation (1) for acquisition by FP systems during the treatment period, 1989-1992. All independent variables are measured as of 1988, the base year. The table contains coefficient estimates and standard errors that have been transformed to reflect the marginal effect of a change in each independent variable on the probability of acquisition, evaluated at the sample means. P-values are determined based on the underlying probit coefficients and associated t-statistics. Column 1 presents estimates excluding the vector of hospital and market controls; estimates with these controls are presented in Column 2. Of the three independent variables of interest, *RTU* is the only measure that predicts FP acquisition during the treatment period.

Using the estimates from column 1, a one-standard-deviation increase in *RTU* is associated with an increase in the probability of acquisition of .005. Given an aggregate probability of acquisition of .033, this represents a 15-percentage-point increase in the probability of acquisition. This estimate rises to 20 percentage points using the model in column 2, which is estimated on a smaller sample as some of the hospital and market controls perfectly predict failure of acquisition and associated observations are dropped. In columns 3 and 4, we consider the possibility that the relationships of interest may be non-linear by including dummies for quintiles of the explanatory variables in place of the continuous measures. These specifications reveal that only hospitals with exceptionally high *RTU* (the top quintile) are significantly more likely to be acquired by FP systems. Relative to hospitals with *RTU* in the bottom quintile, their probability of acquisition is higher by .026 (without controls) to .028 (with controls), an increase of 79 and 76 percentage points, respectively.

The coefficient estimates in columns 3 and 4 also suggest that FP systems avoid hospitals with exceptionally strong operating margins, although this result does not achieve standard levels of statistical significance (p of approximately .10 in both specifications). FP systems also appear to prefer hospitals that are *further* away from other FP system members, but this result is not robust to the inclusion of the vector of hospital and market controls.

As a check on our identification strategy, Table 7 presents results for acquisitions during 1985-1987, using quintiles of the independent variables of interest. These models use *RTU* from 1988 rather than in the base year; the other independent variables are measured in the base year of 1984 (or 1985 for those measures unavailable in 1984). One alternative explanation for our main result is that omitted factors correlated with high post-reform *RTU* are driving the increased propensity to be acquired; by confirming that 1988 *RTU* is not associated with acquisitions during 1985-1987, we can rule out the possibility of such a pattern during the pre-period. The coefficients in columns 1 and 2 of Table 7 offer no support for this alternative hypothesis. Although the aggregate rate of acquisition was much higher during the pre-period, suggesting differences in aggregate acquisition motives between the two periods, it is difficult to explain why in particular the highest-*RTU* hospitals suddenly became more attractive after 1988 when they were not particularly attractive prior to 1988.

The results in Table 7 also indicate that FP systems were much more likely to acquire hospitals in the bottom quintile of operating performance during the early period. Columns 3 and 4 present results for acquisitions between 1993 and 1996; all independent variables for this specification are measured in the base year (1992). During this time period, FP systems are more likely to acquire hospitals in the bottom two quintiles of operating performance, and they avoid hospitals in the top quintile of distance from another FP system member.

Tables 8 and 9 contain estimates from the same specifications as Tables 6 and 7, but the dependent variables are NFP acquisition during the relevant time periods. There is no evidence that NFP systems targeted hospitals with high RTU in any time period. They avoided targets with strong operating performance to some extent during all periods, although this pattern is strongest during the early years. They also appear to prefer targets that are closer to other members of NFP systems, particularly in the early and later periods. Like the relationship between distance and FP acquisition during the treatment period, this association is not robust to the inclusion of controls. However, the patterns are consistent with prior studies, which find that NFP systems tend to be more local than FP systems.

B. Change in Upcoding

In this section, we examine whether acquired hospitals increased their upcoding more than a matched sample of independent hospitals that were not acquired. For this analysis, the outcome measure is the change in RTU over a three-year period spanning the year before the acquisition to 2 years after, i.e. $RTU_{hjr, t(a)+2} - RTU_{hjr, t(a)-1}$. To obtain “matches” to use as a control group, we calculate propensity scores for each hospital using the richest specification in the previous section (i.e. column 4 of Tables 6 and 8). The control groups are selected using the “nearest neighbor” matching algorithm written by Leuven and Sienesi (2003), which selects matches with the nearest propensity score to that of each acquired hospital, subject to the requirement that the covariates are roughly similar (“balanced”).²³ The identifying assumption is that *RTU* in the acquired sample would have changed by the same amount as in the matched sample had the acquisitions not taken place.

Table 10 presents estimates of the average treatment effect (on the treated) of being acquired by a for-profit system (columns 1 and 2) or a not-for-profit system (columns 3 and 4). Columns 1 and 3 present estimates based on a one-to-one match; columns 2 and 4 use three matches for each acquired hospital. Standard errors are adjusted accordingly. The results reveal that hospitals acquired by for-profit systems decreased their RTU significantly more than the matched sample of hospitals that remained independent. The magnitude and precision of this effect is greatest for the one-to-one match: a decline of 1, relative to a mean decline of 1.6 among the combined sample of treatment and control hospitals. The estimated effect of acquisition by an NFP system is large and positive, but noisy. However, two-sided 2 tests easily reject equality

²³See Leuven and Sienesi (2003), “PSMATCH 2: Stata Module to Perform...” We perform the matching separately by year in order to obtain controls with RTU changes over the same time period as each acquired hospital (i.e. hospitals acquired in 1990 are matched to control hospitals in 1990, so that the change in RTU for both treatment and matched units is measured over 1989 to 1992).

of the FP and NFP estimates. These findings suggest that FP systems not only targeted high-RTU hospitals for acquisition, but also successfully increased the upcoding (i.e. decreased the remaining RTU) among their newest members.

6. Conclusion

Firms in highly regulated industries are often faced with opportunities to enhance profits by exploiting regulatory failures or loopholes. Firms that fail to exploit these opportunities, either because they lack the requisite capabilities or because they choose not to do so, may find themselves ripe targets for acquisition. Medicare's 1988 reform to hospital payment rates created precisely such a scenario.

Following the reform, hospitals could increase their revenues by several percentage points by changing their coding of patient charts. Dafny (2005) illustrates that for-profit hospitals exploited this opportunity to a greater extent than their not-for-profit or government-owned peers. We show that for-profit hospital systems targeted for acquisition those hospitals with particularly large opportunities for upcoding. We further find that hospitals with high "room to upcode" were not more likely to be acquired *prior* to the policy change, a result that suggests these acquisitions were indeed motivated by the intent to exploit upcoding opportunities. For-profit systems also made good on their intent: following acquisition, they substantially reduced "room to upcode" among their newly-acquired members, relative to a matched sample of otherwise-similar hospitals that remained independent. After regulators, academics, and the press began exposing upcoding-related fraud, this motive for acquisition disappeared. Despite the financial benefit to doing so, at no time period did not-for-profit systems consider room to upcode in their acquisition decisions.

Many researchers have challenged the motives for hospital acquisitions. Most critics complain that acquisitions often enhance market power at the expense of consumers. Our results suggest that acquisitions may also come at the expense of taxpayers and firms that do not exploit regulations. These findings also suggest that moral suasion as an alternative to regulatory enforcement is less likely to succeed in industries with active takeover markets.

References

- Alexander, J. and Lewis, B., 1984, "Hospital Contract Management: A Descriptive Profile" *Health Services Research* 19(4): 461-477
- Alexander, J. and Morrissey, M., 1989, "A Resource-dependent Model of Hospital Contract Management" *Health Services Research* 24(2): 259-84.
- Assaf, A.R., Lapane, K.L., McKenney, J.L. and Carleton, R.A., 1993, "Possible Influence of the Prospective Payment System on the Assignment of Discharge Diagnoses for Coronary Heart Disease", *New England Journal of Medicine*, 329(13): 931-5.
- Averch, H. and Johnson, L., 1962, "Behavior of the Firm under Regulatory Constraints", *American Economic Review*, 52(5): 1052-1069.
- Brickley, J, Van Horn, R.L. "Managerial Incentives in Nonprofit Organizations: Evidence from Hospitals," *Journal of Law and Economics* 2002, 95 (1): 227-250.
- Connor, R.A., Feldman, R.D., Dowd, B.E., and Radcliff, T.A., 1997, "Which types of hospital mergers save consumers money?" *Health Affairs*, 16(6): 62-74
- Cuellar, A. and P. Gertler, 2005, "How the Expansion of Hospital Systems Has Affected Consumers," *Health Affairs*, 24(1): 213-220.
- Cutler, David M., 1995, "The Incidence of Adverse Medical Outcomes under Prospective Payment," *Econometrica*, 63(1): 29-50.
- Dafny, L., 2005, "How Do Hospitals Respond to Price Changes", *American Economic Review*, 95(5): 1525-1547.
- Desai, M. and James R. Hines, Jr., 2002, "Expectations And Expatriations: Tracing The Causes And Consequences Of Corporate Inversions," *National Tax Journal*, 55(3): 409-440.
- Dranove, D. and Lindrooth, R., 2003, "Hospital Consolidation and Costs: Another Look at the Evidence", *Journal of Health Economics*, 22: 983-997.
- Duggan, M., 2002, "Hospital Market Structure and the Behavior of Not-For-Profit Hospitals", *RAND Journal of Economics*, Autumn: 433-446.
- Duggan, M. and Scott Morton, F., 2006. "The Distortionary Effects of Government Procurement: Evidence from Medicaid Prescription Drug Purchasing," *Quarterly Journal of Economics*, forthcoming.
- Glaeser, E., Laibson, D., Scheinkman, J. and Soutter, C., 2000, "Measuring Trust", *Quarterly Journal of Economics*, 115(3): 811-846.
- Golden, D. and Kurkjian, S. "The Fraud Factor: Hidden Costs of Health Care" *Boston Globe*, 7/31/1994, p. 1.

- Goolsbee, A., 2000. "What Happens When You Tax the Rich? Evidence from Executive Compensation," *Journal of Political Economy*, 108(2): 352-378.
- Hall, B. and Leibman, J., 1998, "Are CEOs Really Paid Like Bureaucrats?," *Quarterly Journal of Economics*, 113(3): 653-691
- Hall, B. and Liebman, J., 2000. "The Taxation of Executive Compensation," *Tax Policy and the Economy*, ed. James M. Poterba (14).
- Horwitz, J., 2005, "Making Profits and Providing Care: Comparing Nonprofit, For-Profit and Government Hospitals", *Health Affairs*, 24(3): 790-801.
- Kyle, M., 2005, "Pharmaceutical Price Controls and Entry Strategies", *Review of Economics and Statistics*, forthcoming.
- Lagnado, L., 1997, "Columbia/HCA Graded Its Hospitals on Severity of Their Medicare Claims," *The Wall Street Journal*, May 30, pp. A1, A6.
- Leibenstein, H., 1966, "Allocative Efficiency vs. X Inefficiency," *American Economic Review*, June, 56(3): 392-416.
- Lipman, L. "FBI Chief: Health-care Fraud Endemic" *Denver Post*, 3/22/1995, p. A-13.
- Mobley, L.R., 1997. "Multihospital Chain Acquisitions and Competition in Local Health Care Markets," *Review of Industrial Organization*, 12(2): 185-202.
- Roomkin, M. and B. Weisbrod,, 1999, "Managerial Compensation and Incentives in For-profit and Nonprofit Hospitals," *Journal of Law, Economics, and Organization*, October: 750-781.
- Rose, N. and Wolfram, C., 2002, "Regulating Executive Pay: Using the Tax Code to Influence CEO Compensation," *Journal of Labor Economics*, 20 (2): S138-S175.
- Silverman, E., and J. Skinner, 2004, "Medicare Upcoding and Hospital Ownership", *Journal of Health Economics*, 23(2): 369-90.
- Thomas, J., "Senator: Health Care Fraud Costs Staggering" *St. Petersburg Times*, 7/9/1994, p. 6a.
- Town, R. and W. Vogt, 2006, "How Has Hospital Consolidation Affected the Price and Quality of Hospital Care?" *Robert Wood Johnson Foundation*.
- Winter, A. and Pettengill, J., 2003, "Relationships among Medicare inpatient, overall Medicare and total margins for hospitals" *Report to the Medicare Payment Advisory Commission*.

Table 1: Ownership Status of U.S. Non-Federal Community Hospitals

Year	NFP	GOV	FP system	FP other	Total Hospitals
1985	3221	1503	653	148	5525
%	58%	27%	12%	3%	100%
1996	2878	1248	562	123	4811
%	60%	26%	12%	3%	100%

Table 2: Acquisitions by Ownership Type, 1985-1996

	NFP Acquirer		GOV Acquirer		FP Acquirer	
NFP Target	379	82.2%	1	9.1%	94	34.8%
GOV Target	78	16.9%	10	90.9%	93	34.4%
FP Target	4	0.9%			83	30.7%
Total	461		11		270	

Table 3. Examples of Policy Change

DRG code	Description in 1987 (Description in 1988)	1987 weight	1988 weight	percent change in weight	1987 volume (20 percent sample)	1988 volume (20 percent sample)	percent change in volume
96	bronchitis and asthma age>69 and/or CC (bronchitis and asthma age>17 with CC)	0.8446	0.9804	16%	44,989	42,314	-6%
97	bronchitis and asthma age 18-69 without CC (bronchitis and asthma age>17 without CC)	0.7091	0.7151	1%	4,611	10,512	128%
138	cardiac arrhythmia and conduction disorders age>69 and/or CC (cardiac arrhythmia and conduction disorders with CC)	0.8136	0.8535	5%	45,080	35,233	-22%
139	cardiac arrhythmia and conduction disorders age<70 without CC (cardiac arrhythmia and conduction disorders without CC)	0.6514	0.5912	-9%	4,182	16,829	302%
296	nutritional and misc. metabolic disorders age>69 and/or CC (nutritional and misc. metabolic disorders age>17 with CC)	0.8271	0.9259	12%	45,903	38,805	-15%
297	nutritional and misc. metabolic disorders age 18- 69 without CC (nutritional and misc. metabolic disorders age>17 without CC)	0.6984	0.5791	-17%	2,033	12,363	508%

Notes: Of the 95 DRG pairs, these three occur most frequently in the 1987 20 percent MedPAR sample. DRG weights are from the *Federal Register*.
Source: Dafny (2005).

Table 4: Acquisitions in Study Sample

Period	Number of independent hospitals at start	Acquired by FP	Acquired by NFP
1985-1987	2842	161	200
1989-1992	2459	84	93
1993-1996	2352	149	238

Table 5: Descriptive Statistics – 1985, 1989 and 1993

Variable	N	Mean	Std. Dev.
Base year = 1985			
RTU	2675	0.815	0.367
FP distance	2838	66.193	116.52
NFP distance	2838	24.452	22.289
Residual Profits	2635	0.532	7.358
High Tech	2842	1.455	1.721
Base Year=1989			
RTU	2367	6.645	2.502
FP distance	2454	74.899	130.934
NFP distance	2454		
Residual Profits	2325	0.809	7.981
High Tech	2459	1.625	1.724
Base Year=1993			
RTU	2219	4.985	2.172
FP distance	2337	88.758	136.873
NFP distance	2337		
Residual Profits	2216	0.574	7.330
High Tech	2352	1.948	1.756

Notes: RTU and Residual Profits are multiplied by 100, so that both can be interpreted (approximately) as percentage points. Sample includes all independent, secular hospitals with 30+ beds at the start of each period.

Table 6: Determinants of FP Acquisition, Treatment Period (1989-92)

	(1)	(2)	(3)	(4)
RTU	0.002*	0.003**		
	(0.001)	(0.001)		
RTU Quintiles				
2			0.010	0.009
			(0.012)	(0.012)
3			0.006	0.010
			(0.012)	(0.012)
4			-0.004	0.001
			(0.010)	(0.011)
5			0.026**	0.028**
			(0.014)	(0.015)
Residual Profit	-0.001	-0.001		
	(0.000)	(0.000)		
Residual Profit Quintiles				
2			0.001	0.008
			(0.010)	(0.011)
3			-0.003	0.002
			(0.009)	(0.010)
4			-0.009	-0.005
			(0.008)	(0.009)
5			-0.015	-0.015*
			(0.008)	(0.007)
Distance	0.000	-0.000		
	(0.000)	(0.000)		
Distance quintiles				
2			0.021	0.006
			(0.015)	(0.013)
3			0.026**	0.009
			(0.016)	(0.014)
4			0.006	-0.007
			(0.014)	(0.012)
5			0.034**	0.010
			(0.020)	(0.017)
Region fixed effects	Y	Y	Y	Y
Hospital and Market Controls	N	Y	N	Y
N	2322	2095	2322	2095
Mean(dependent variable)	.033	.037	.033	.037

Notes: Table reports estimated marginal effects (standard errors) of covariates on the probability of acquisition, evaluated at sample means. The p-values correspond to the hypothesis test of the underlying probit coefficient being equal to zero. (These are the estimates and p-values produced by the "dprobit" command in Stata.) Some controls and associated observations are dropped as they perfectly predict failures; this generates small differences in N across models.

* denotes $p < .10$, ** denotes $p < .05$, *** denotes $p < .01$

Table 7: Determinants of FP Acquisition, Pre (1985-87) and Post (1993-96) Periods

	(1)	(2)	(3)	(4)
Time Period	1985-87	1985-87	1993-96	1993-96
RTU Quintiles				
2	0.006 (0.013)	0.006 (0.012)	-0.002 (0.013)	-0.000 (0.012)
3	-0.002 (0.013)	0.003 (0.011)	0.006 (0.014)	0.010 (0.014)
4	-0.013 (0.012)	-0.007 (0.010)	-0.003 (0.013)	0.002 (0.013)
5	-0.014 (0.011)	-0.014 (0.009)	-0.007 (0.013)	-0.003 (0.013)
Residual Profit Quintiles				
2	-0.024** (0.009)	-0.014 (0.009)	-0.007 (0.012)	-0.001 (0.012)
3	0.032*** (0.009)	-0.022** (0.008)	0.033*** (0.009)	-0.027** (0.009)
4	0.028*** (0.009)	-0.021** (0.008)	0.030*** (0.009)	-0.023** (0.009)
5	0.035*** (0.008)	0.030*** (0.007)	0.030*** (0.009)	0.026*** (0.009)
Distance quintiles				
2	-0.014 (0.012)	-0.014 (0.011)	-0.008 (0.011)	-0.011 (0.011)
3	0.001 (0.013)	-0.008 (0.012)	-0.017 (0.011)	-0.015 (0.011)
4	0.007 (0.015)	-0.002 (0.014)	-0.017 (0.012)	-0.016 (0.013)
5	0.006 (0.016)	-0.006 (0.015)	-0.040** (0.012)	-0.037** (0.012)
Region fixed effects	Y	Y	Y	Y
Hospital and Market Controls	N	Y	N	Y
N	2584	2466	2204	2204
Mean(dependent variable)	.053	.056	.062	.062

Notes: Table reports estimated marginal effects (standard errors) of covariates on the probability of acquisition, evaluated at sample means. The p-values correspond to the hypothesis test of the underlying probit coefficient being equal to zero. (These are the estimates and p-values produced by the "dprobit" command in Stata.) Some controls and associated observations are dropped as they perfectly predict failures; this generates small differences in N across models. For 1985-87, RTU quintiles are calculated using 1988 RTU. For 1993-1996, RTU quintiles are based on RTU lagged by 1 year.

* denotes $p < .10$, ** denotes $p < .05$, *** denotes $p < .01$

Table 8: Determinants of NFP Acquisition, Treatment Period (1989-92)

	(1)	(2)	(3)	(4)
RTU	0.001 (0.001)	0.001 (0.001)		
RTU Quintiles				
2			0.008 (0.013)	0.010 (0.013)
3			0.010 (0.013)	0.011 (0.013)
4			0.018 (0.014)	0.019 (0.014)
5			0.013 (0.014)	0.016 (0.014)
Residual Profit	-0.001* (0.000)	-0.001* (0.000)		
Residual Profit Quintiles				
2			-0.015 (0.008)	-0.015* (0.007)
3			-0.013 (0.008)	-0.011 (0.008)
4			-0.005 (0.009)	-0.004 (0.008)
5			-0.020** (0.008)	-0.016* (0.007)
Distance	-0.000** (0.000)	-0.000** (0.000)		
Distance quintiles				
2			-0.006 (0.010)	-0.004 (0.010)
3			-0.009 (0.009)	-0.009 (0.010)
4			-0.008 (0.009)	-0.009 (0.011)
5			-0.018* (0.008)	-0.018 (0.009)
Region fixed effects	Y	Y	Y	Y
Hospital and Market Controls	N	Y	N	Y
N	2322	2234	2322	2234
Mean(dependent variable)	.035	.037	.035	.037

Notes: Table reports estimated marginal effects (standard errors) of covariates on the probability of acquisition, evaluated at sample means. The p-values correspond to the hypothesis test of the underlying probit coefficient being equal to zero. (These are the estimates and p-values produced by the "dprobit" command in Stata.) Some controls and associated observations are dropped as they perfectly predict failures; this generates small differences in N across models.

* denotes $p < .10$, ** denotes $p < .05$, *** denotes $p < .01$

Table 9: Determinants of NFP Acquisition, Pre (1985-87) and Post (1993-96) Periods

Time Period	(1) 1985-87	(2) 1985-87	(3) 1993-96	(4) 1993-96
RTU Quintiles				
2	-0.014 (0.014)	-0.012 (0.013)	0.002 (0.019)	-0.007 (0.017)
3	-0.001 (0.015)	0.002 (0.014)	-0.019 (0.018)	- 0.026*
4	-0.003 (0.015)	-0.003 (0.014)	-0.010 (0.018)	-0.022 (0.017)
5	0.001 (0.015)	0.002 (0.014)	-0.016 (0.018)	-0.023 (0.017)
Residual Profit Quintiles				
2	-0.006 (0.013)	-0.003 (0.013)	0.021 (0.021)	0.012 (0.019)
3	-0.018 (0.012)	-0.018 (0.011)	-0.000 (0.019)	-0.001 (0.018)
4	-0.042*** (0.011)	-0.041*** (0.009)	0.015 (0.020)	0.008 (0.019)
5	-0.036*** (0.011)	-0.038*** (0.010)	-0.032* (0.018)	-0.028 (0.017)
Distance quintiles				
2	-0.026** (0.012)	-0.015 (0.013)	-0.003 (0.018)	0.010 (0.019)
3	-0.040*** (0.011)	-0.027* (0.013)	-0.038** (0.016)	0.010 (0.023)
4	-0.024* (0.012)	-0.010 (0.016)	-0.045*** (0.015)	0.012 (0.024)
5	-0.041*** (0.011)	-0.025 (0.015)	-0.070*** (0.014)	-0.013 (0.024)
Region fixed effects	Y	Y	Y	Y
Hospital and Market Controls	N	Y	N	Y
N	2584	2584	2204	2204
Mean(dependent variable)	.070	.070	.102	.102

Notes: Table reports estimated marginal effects (standard errors) of covariates on the probability of acquisition, evaluated at sample means. The p-values correspond to the hypothesis test of the underlying probit coefficient being equal to zero. (These are the estimates and p-values produced by the "dprobit" command in Stata.) Some controls and associated observations are dropped as they perfectly predict failures; this generates small differences in N across models. For 1985-87, RTU quintiles are calculated using 1988 RTU. For 1993-1996, RTU quintiles are based on RTU lagged by 1 year.

* denotes $p < .10$, ** denotes $p < .05$, *** denotes $p < .01$

Table 10: Change in Uproom Following Acquisition

Dependent variable: $uproom_{t(a)+2} - uproom_{t(a)-1}$

Sample: hospitals acquired in year $t(a)$, $1989 \leq t(a) \leq 1992$, and matches based on nearest propensity scores

	FP Acquisitions		NFP acquisitions	
	(1)	(2)	(3)	(4)
Average Treatment Effect	-			
	1.013**	-.707*	.710	.501
	(.453)	(.389)	(.425)	(.361)
Number of treatment hospitals	75	75	78	78
Number of matches per treatment hospital	1	3	1	3
Total number of observations	150	286	152	279
Mean of dependent variable	-1.573	-1.219	-1.522	-1.418
Std error of dependent variable	(2.826)	(2.901)	(2.576)	(2.744)

Notes: Matches are drawn with replacement, hence some control hospitals may match to more than one treatment hospital. Control hospitals are weighted to reflect the number of times they are matched to a treatment hospital as well as the total number of matches per treatment hospital.

* denotes $p < .10$, ** denotes $p < .05$, *** denotes $p < .01$

Figure 1

